Cerebellum

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Loops with cortex
Recurrent loops with specific cortical areas

(Stick)

Divisions of the cerebellum
Inputs and outputs

Output tracts from spinocerebellum
Repeated semi-topographic maps

Circuit diagram
More circuits

Simple and complex spikes in Purkinje cells

Parallel fibers  Climbing fibers
Directional tuning of Purkinje cells

Summary data from 5 cells:
(Ebner)
Purkinje cell activity for grasping different objects

Role in active sensing
Basic model of learning

(Marr and Albus, many subsequent variations)

• mossy/parallel fibers carry information about everything (“context”)
• climbing fibers carry error/mismatch/surprise information
• complex spikes (caused by climbing fibers) reduce the strengths of parallel fiber -> Purkinje cell synapses, but only for parallel fibers that are active
• as a result, “punished” parallel fibers have less effect on the Purkinje cells

Lesions/inactivation abolish classical conditioning and reflex adaptation

Role in prism adaptation
Role in force field adaptation

(Shadmehr)

Learning to use new a “tool” (weird mouse)

(Imamizu et al)
Learning internal models

(Kawato)